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Information Bulletin

Grade 3 Mathematics
1994-97

This document was written primarily for:

Students	✓
Teachers	✓
Administrators	✓
Parents	
General Audience	
Others	✓ Superintendents

This bulletin contains general information about the Achievement Testing Program and information specific to the Grade 3 Mathematics Assessment. Additional copies of the bulletin may be made as needed.

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October 1994

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General Information

The Achievement Testing Program provides teachers, parents, students, school administrators, Alberta Education, and the public with information about what students know and can do in relation to provincial standards. Group results are reported at school, district, and provincial levels to improve learning opportunities for students.

The assessments are administered in two subject areas at Grade 3—language arts and mathematics—and in four subject areas at grades 6 and 9—language arts, mathematics, social studies, and science.

The assessments are based on provincial standards, which reflect important learnings in the subject areas listed above. Classroom teachers from across the province are extensively involved in developing and field testing the assessment instruments.

Administering the Assessment

Information about the nature of the provincial assessments as well as their administration to special-needs students can be found in the *General Information Bulletin, Achievement Testing Program*, which has been mailed to all superintendents and principals.

Schedule

The written-response component of English and French Language Arts must be administered during the first week of June. The machine-scorable component of all achievement tests must be administered during the last two weeks of June. Specific information regarding scheduling is provided in the current *General Information Bulletin*.

To minimize any risks to security, we recommend that all students complete the test on the same day. Students who are absent when the tests are administered and who return to school by the end of the school year must write the tests upon their return. By scheduling the tests early in the administration period, schools can ensure that most, if not all, absentees are tested. The principal is responsible for ensuring the security of the tests.

Beginning in 1995, the tests that will be administered each year are:

Grade 3

English Language Arts (*Part A: Writing and Part B: Reading*)

Mathematics (English and French forms)

Grade 6

English Language Arts (*Part A: Writing and Part B: Reading*)

Mathematics (English and French forms)

Social Studies (English and French forms)

Science (English and French forms)

Français 6^e Année (*Partie A: Production écrite and Partie B: Lecture*)

Grade 9

English Language Arts (*Part A: Writing and Part B: Reading*)

Mathematics (English and French forms)

Social Studies (English and French forms)

Science (English and French forms)

Français 9^e Année (*Partie A: Production écrite and Partie B: Lecture*)

Students in French Language Programs

Beginning in June 1995, all students in Francophone and French Immersion programs must write the French form of the achievement tests. Alberta Education will send enrollment forms to schools by February requesting an indication of how many English or French tests are required. These forms must be returned through jurisdiction offices by mid-March.

Marking Achievement Tests Locally

Beginning in June 1995, teachers will be able to mark the tests before returning them to Alberta Education. Teachers can use the results as part of an individual student's year-end assessment, as well as for planning instruction. Additional information regarding local marking of tests will be provided in December 1994.

Reporting the Results

Each school jurisdiction will receive a district report and school reports for their students' achievement, as well as guidelines for interpreting these results in relation to provincial standards.

To facilitate reflection on school programs, we expect that results will be shared with all school staffs (not just teachers of grades 3, 6, and 9), as well as with parents and the community.

Individual student profiles will be sent to the school that the student will attend in September. We also expect that these reports will be shared with parents.

Provincial results will be made public in September. A detailed *Achievement Testing Program Provincial Report* is published annually.

Broadened Assessment Initiatives

The Student Evaluation Branch has developed additional instruments to collect a broader base of information about what students know and can do than achievement tests themselves can provide. These instruments will be administered to a provincial sample of students in all subjects on a rotating basis:

Grade 3

- 1995 • "whole book" performance-based assessment in language arts
- 1996 • problem-solving activities in mathematics
- 1997 • "whole book" performance-based assessment in language arts
- 1998 • problem-solving activities in mathematics

Grade 6

- 1995 • problem-solving activities in mathematics
- 1996 • "whole book" performance-based assessment in language arts
- 1997 • problem-solving and decision-making activities in social studies
- 1998 • performance tasks in science

Grade 9

- 1995 • problem-solving and decision-making activities in social studies
- 1996 • problem-solving activities in mathematics
- 1997 • performance tasks in science
- 1998 • performance tasks in language arts

Description of the Mathematics Assessment Standards

The provincial standards are the basis upon which we assess how well students have learned mathematics by the end of Grade 3. These standards reflect the essential learnings that all Alberta students are expected to achieve. Provincial standards are useful, therefore, for assessing Grade 3 students in all types of school programs—public, private, and home education.

Purpose of Assessment Standards

These statements describe what is expected of Grade 3 students who are meeting the *acceptable standard* or the *standard of excellence* on independent work at the end

of the Grade 3 Mathematics program. The statements represent the standards against which student achievement will be measured. By comparing actual results to provincial standards, decisions can be made about whether achievement is in fact “good enough.”

Acceptable Standard

Students who meet the *acceptable standard* in Grade 3 Mathematics are expected to have a basic understanding of mathematical concepts and related procedural knowledge. They are expected to be able to demonstrate their understanding in concrete, pictorial, and symbolic modes and be able to translate from one mode to another. For example, students meeting the *acceptable standard* should know that the solution to the number sentence $12 - 3 = \square$ is 9 and be able to demonstrate their understanding in concrete and pictorial ways. They are expected to be able to write related number sentences and verify them using manipulatives and diagrams.

To meet the *acceptable standard*, students are expected to present ideas in an understandable way using objects, diagrams, and appropriate everyday language.

Students meeting the *acceptable standard* are expected to perform the mathematical operations and procedures that are fundamental to the program and apply what they know in solving simple problems in familiar settings. They are able to describe, to a limited degree, the steps they use to solve a particular problem.

The expectation is that students meeting the *acceptable standard* have a positive attitude about mathematics in their daily lives. They are able to demonstrate confidence when using simple mathematical procedures and when applying problem-solving strategies in familiar settings.

Standard of Excellence

Students who meet the *standard of excellence* in Grade 3 Mathematics are expected to have a superior understanding of mathematical concepts and related procedural knowledge. They are consistently able to demonstrate their understanding in concrete, pictorial, and symbolic modes and easily translate from one mode to another. They are able to create problem situations to illustrate concepts and to analyze and explain relationships among concepts. For example, students meeting the *standard of excellence* should be able to write all number sentences related to $12 - 3 = \square$, justify them using manipulatives and diagrams, and create problem situations to exemplify the relationship. They should be able to explain how $12 \div 3 = \square$ is related to $12 - 3 = \square$; also, they should be able to explain why these are not related number sentences.

To meet the *standard of excellence*, students are expected to verbalize and write about mathematical situations clearly, using correct technical terms.

Students meeting the *standard of excellence* are expected to perform the mathematical operations and procedures that are fundamental to the program and to be able to apply what they know in solving and creating novel problems. They are able to clearly describe the steps that they or other students use.

Students meeting the *standard of excellence* should have a positive attitude toward mathematics and show confidence in performing mathematical tasks. They are expected to be self-motivated risk-takers who persevere when solving novel problems. They take initiative in trying new methods and are creative in their approach to problem solving.

Grade 3 Mathematics Assessment

General Description

The Grade 3 Mathematics Assessment consists of four components:

- *Machine-scorable component*—completed by all Grade 3 students in the province
- *Timed number facts*—completed by a provincial sample of Grade 3 students (to be administered in 1995)
- *Performance-based component*—completed by a provincial sample of Grade 3 students (to be administered in 1996)
- *Learning Contexts Survey*—completed by a provincial sample of Grade 3 teachers and students (to be administered in 1996)

Machine-Scorable Component

The machine-scorable component has 50 questions integrated in a two-part narrative. Parts A and B are approximately the same length. Each part is designed to be completed in 30 minutes. However, additional time of approximately 15 minutes may be provided for students to complete each part. Also, a recess break should be provided between each part.

The blueprint for the machine-scorable component is on page 5 of this bulletin, followed by sample questions, beginning on page 7, that teachers can use with students to help them prepare for the provincial assessment.

Students will record answers to all questions directly in the test booklet.

Students will require pencils, rulers, and erasers. They may also need scrap paper.

Students may use manipulative materials and calculators. It is recommended that students use calculators only if they generally use them in their math program. Calculators are not needed to successfully complete the assessment.

Reporting Categories Indicators

The following points briefly highlight the learnings for each reporting category.

Knowledge and Skills

- recalls facts, concepts, terminology
- knows number facts
- recognizes place value
- performs algorithms, computations
- performs constructions, measurements
- uses calculators, computers
- knows mental computation, estimation strategies

Application and Problem Solving

- demonstrates conceptual understanding by:
 - representing basic mathematical concepts in concrete, pictorial, and /or symbolic modes
 - applying a mathematical concept in familiar situations
 - creating new problem situations that exemplify a concept
 - judging reasonableness of answers
 - justifying answers
 - communicating why and when certain strategies are appropriate
- understands basic mathematical concepts
- understands relationships among numbers, operations, number forms, and modes of representation
- understands relationships among geometric forms
- understands the problem-solving process
- uses a variety of strategies
- applies mathematical concepts to new situations

Blueprint

Strands	Reporting Categories		Total Number of Questions
	Knowledge and Skills	Application and Problem Solving	
Numeration	5	9	14
Operations and Properties	7	10	17
Measurement	3	7	10
Geometry	3	1	4
Graphing	2	3	5
Total Number of Questions	20	30	50

Timed Number Facts

In 1995, a provincial sample of Grade 3 students will be selected to participate in the timed number-facts test. This test consists of number facts in addition and subtraction. Students will write their answers to the questions directly in the test booklet.

Performance-Based Component

In 1996, a provincial sample of Grade 3 students from across the province will be selected to participate in the performance-based assessment in mathematics. The assessment provides students with real-life problem-solving activities and addresses the learner expectations that cannot be easily measured using only paper-and-pencil strategies. The problem-solving and writing activities involved in the assessment have been developed by teachers and are designed to model good classroom instruction and assessment methods.

Students will be asked to read a book and then solve several problems related to the context of the book. They will also be asked to reflect on their strategies and answers in written form. From this assessment, we will obtain valuable information about how

students apply their knowledge in different areas when solving real-life problems.

In 1995 and 1997, a performance-based component in language arts will be administered to a provincial sample of Grade 3 students.

Learning Contexts Survey

Each year, learning context survey questionnaires will be given to a provincial sample of Grade 3 teachers and students.

In 1995 and 1997, the learning context survey will focus on the language arts program, and in 1996, it will focus on the math program.

The purpose of the student questionnaire in mathematics is to examine the extent to which important math attitudes are evident, to look at student attitudes toward mathematics, and to correlate these attitudes with achievement.

The purpose of the teacher questionnaire in mathematics is to study the effect on student achievement of classroom environment, instructional strategies, approaches to problem solving, and use of manipulative materials.

Confirming Standards

Confirming standards is a process whereby judgements about students' performance on the assessment are made in relation to provincial standards. For more information on confirming standards procedures, refer to Appendix A of the *Achievement Testing Program Provincial Report, June 1993 Administration*.

Preparing Students for the Assessment

Suggestions for Teachers Administering the Assessment Example

These suggestions are to help teachers administer the sample assessment, given on the following pages, in the same way that Section 1 of the machine-scorable component will be administered.

Read the text that appears on the first page of the sample assessment (page 7 of this bulletin) to your students. Feel free to discuss the map and opening part of the story. Help your students become comfortable with the story setting.

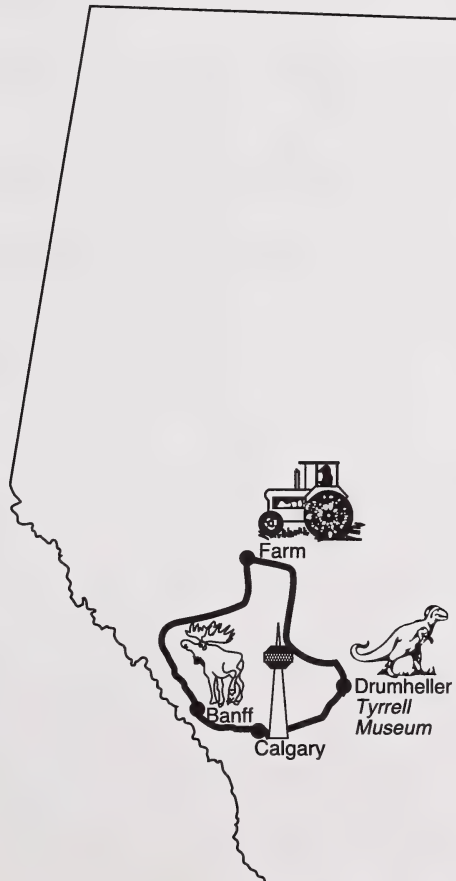
When the students are ready to begin the math questions, *instruct them to read and complete the questions independently*. Be careful to ensure that students know how to mark their answers to the questions directly on the page.

Assessment Example

This collection of questions does not represent the test emphasis as presented in the blueprint.

VACATION TIME!

Pretend your friends came to Calgary to take a trip with you. You picked them up at the Calgary Airport and left on your trip. First, you went camping and saw the sights in Banff National Park. Then you went to your Uncle Walter's and Aunt Vi's farm. Your final stop was the world famous Tyrrell Museum where you learned more about dinosaurs. Finally, you returned to Calgary. The map below shows where you went on your trip.



1. Your friends arrived on the last Saturday in June.

Shade in that square on the calendar.

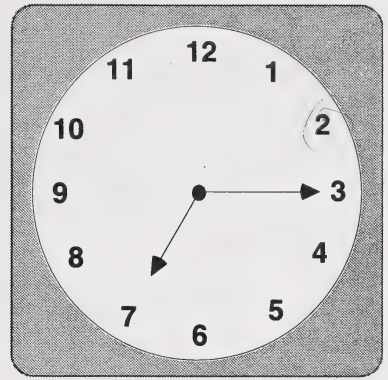
June 1993						
SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

2. You left Calgary at 7:15 A.M.

After 55 min, you stopped for gas.

What time was it when you stopped?

- ☐ 7:55
- ☐ 8:00
- ☐ 8:10
- ☐ 8:15



3. The distance meter on your car read 517 km when you left the airport.

The meter read 692 km when you arrived at Banff.

At Airport

			5	1	7
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At Banff

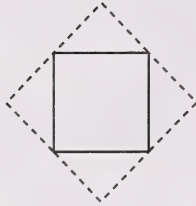
			6	9	2
--	--	--	---	---	---

How far did you travel from the airport to Banff?

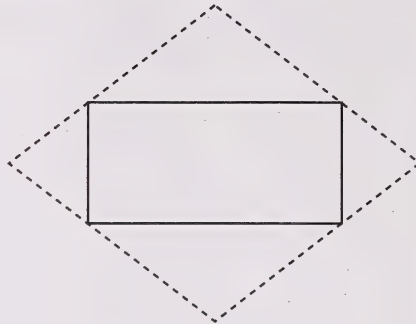
- ☐ 157 km
- ☐ 175 km
- ☐ 517 km
- ☐ 715 km

4. Your friends brought a cube pushout puzzle for you.

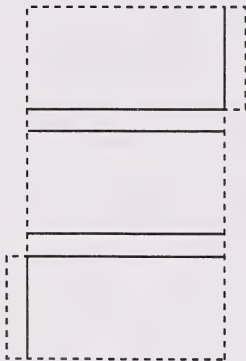
Which picture could be pushed out and folded to make a cube?



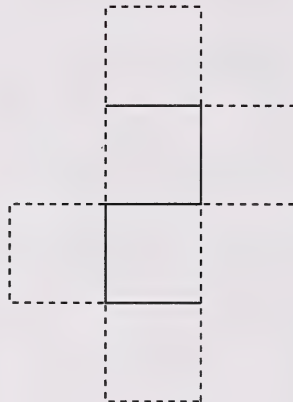
☐



☐



☐



☒

5. When you got to Banff, you drove 7 blocks, turned left, and went 5 more blocks.

You turned left again and drove 1 more block to get to the Tourist Information Center.

How many blocks did you travel in all?

- ☐ 12
- ☐ 13
- ☐ 14
- ☐ 15

From Banff, you went to your aunt's and uncle's farm.

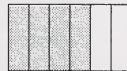
Use this information to answer questions 6 and 7.

Uncle Walter has ten milk cows. Six of the cows are being fed a special diet of hay and vitamins. Four of the cows are being fed only hay.

6. Which rectangle shows the fraction of cows that are being fed a SPECIAL DIET?



☐ O



☐ O



☐ O



☐ O

7. Which decimal shows the fraction of cows that are being fed a SPECIAL DIET?

- ☐ O 0.4
☐ O 0.6
☐ O 4.0
☐ O 6.0

8. On Monday, Uncle Walter's neighbour collected 123 L of milk.

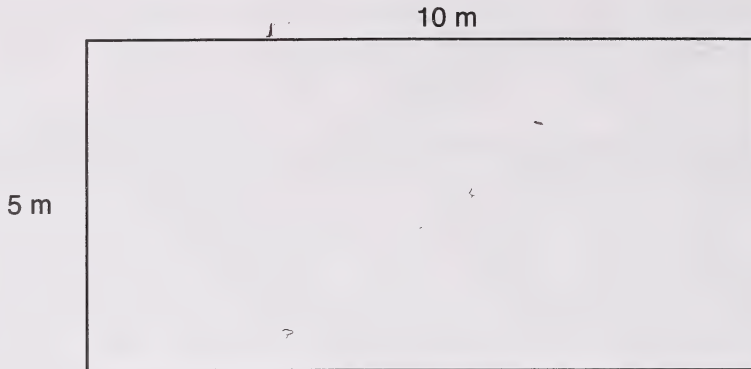
The family used 17 L. The rest of the milk was sold to the dairy.

How many litres of milk were sold?

- ☐ O 106
☐ O 114
☐ O 116
☐ O 140

Use this information to answer question 9.

Aunt Vi has a garden that is 5 m wide and 10 m long. She built a fence around it to keep animals out.



9. How many metres of fence did she need?

- ☐ 20 m
- ☒ 25 m
- ☐ 30 m
- ☐ 35 m

10. Aunt Vi watched the plants in her garden sprout. She saw that
the carrots sprouted before the beans,
the corn sprouted after the beans, and
the potatoes sprouted before the carrots.

What is the order in which the plants sprouted?

- ☐ Potatoes, corn, carrots, beans
- ☐ Corn, potatoes, carrots, beans
- ☐ Carrots, corn, beans, potatoes
- ☒ Potatoes, carrots, beans, corn

11. The next stop was Drumheller.

Your friends asked how far it was to other cities.

Your map shows the following distances:

Edmonton	274 km
Red Deer	163 km
Calgary	138 km
Lethbridge	296 km
Medicine Hat	245 km

What is the order of these distances from GREATEST to LEAST?

- ☐ 296 km, 245 km, 274 km, 163 km, 138 km
- ☐ 296 km, 274 km, 245 km, 163 km, 138 km
- ☐ 163 km, 138 km, 274 km, 245 km, 296 km
- ☐ 138 km, 163 km, 245 km, 274 km, 296 km

12. On the way to the Tyrrell Museum, there is a little church with a tower.



What is the name of the geometric shape shaded at the top of the tower?

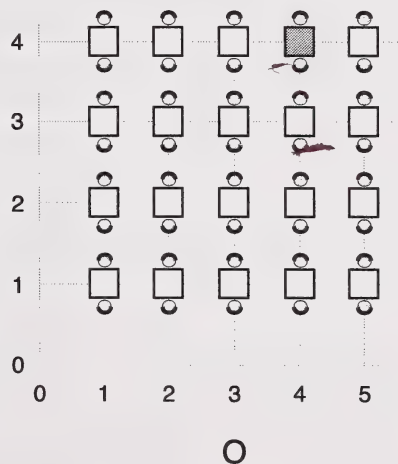
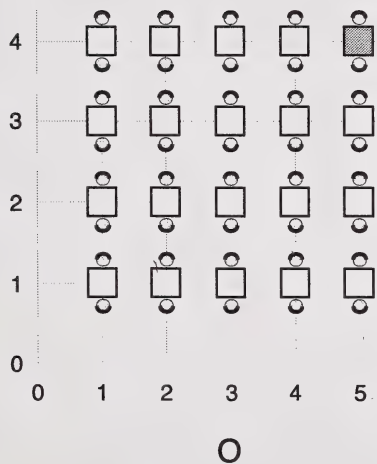
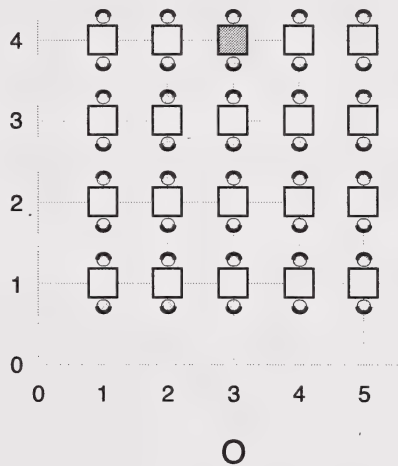
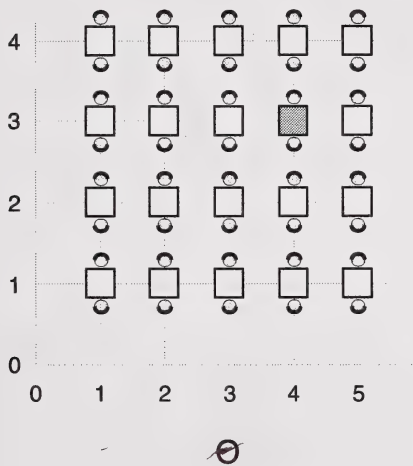
- ☐ cone
- ☐ cylinder
- ☐ prism
- ☐ pyramid

13. After the visit through the museum, you went to the cafeteria.

The tables were arranged in columns and rows.

Your friends went to the table at column 4, row 3.

Which shows their table correctly shaded?



14. When you arrived back in Calgary, you wrote in your journal the total distance you traveled.

Your father said that the distance was “one thousand two hundred seven” kilometres.

How is this distance written as a number?

- ☐ 127
☐ 1027
☐ 1207
☐ 1270

Key and Descriptors

#	Key	Program Strand	Reporting Category*	Curriculum Standard	Examples of Assessment Standard**
1	shades correct date	Measurement	P	Reads the date on the calendar	A
2	C	Measurement	P	Adds time and expresses it in digital form	E
3	B	Operations and Properties	K	Subtracts two 3-digit numbers with one regrouping	A
4	D	Geometry	P	Constructs a simple 3-dimensional object from a net	E
5	B	Operations and Properties	K	Adds three addends	A
6	C	Numeration	P	Recognizes a rectangle with 10 equal parts, with 6 parts shaded and 4 unshaded representing $\frac{6}{10}$	A
7	B	Numeration	P	Writes the decimal from a physical situation	E
8	A	Operations and Properties	K	Subtracts a 2-digit number from a 3-digit number with one regrouping	A
9	C	Operations and Properties	P	Adds 2 addends and multiplies by 2	A
10	D	Numeration	P	Uses clues to order events	E
11	B	Numeration	P	Orders 3-digit numbers	A
12	D	Geometry	K	Identifies a 3-dimensional object as a pyramid	A
13	A	Graphing	P	Identifies the correct display of a specific position on a grid	E
14	C	Numeration	K	Reads and writes a number in the thousands	A

* P—Application and Problem Solving, K—Knowledge and Skills

** A—Students meeting the acceptable standard should be able to correctly answer questions such as these.

E—In addition to answering the questions identified for the acceptable standard, students meeting the standard of excellence should be able to correctly answer questions such as these.

Suggestions for Students

We hope that teachers will share the following information with their students to help them prepare for the Mathematics assessment.

I strongly advocate preparing children to understand tests and testing through extensive class discussion about the makeup of the test and how to take it, and then adequate practice to find out their own particular weaknesses in approaching tests.

—Graves, p. 183

It is most important that instructional time be spent on the important learnings in Grade 3 Mathematics. Teachers may also wish to familiarize students with the format of the machine-scorable component of the assessment and the kinds of questions that will appear on it by having them work through the sample questions included in this bulletin.

Suggestions for Answering Multiple-Choice Questions

The following suggestions are provided to help prepare students for the Grade 3 Mathematics machine-scorable component.

Have students:

Listen to the story before they complete the mathematics questions in each part. This will give a setting for the questions they do on their own.

Use other information given by:

- a. looking at all the information and thinking carefully about it before they try to answer the questions; or

- b. reading the questions first and then looking at the information, remembering the questions they need to answer.

Go back to the information before answering each question when they need information for more than one question.

Make sure they look at all types of information given. Information may be given in words, charts, pictures, graphs, and maps.

Check their work when they calculate an answer, even when their answer is one of the choices.

Choose the answer they think is best when answering questions. If they don't see a correct or best answer right away, have them try to find the two choices that seem closest to the correct answer and choose one of them.

Credit

Donald H. Graves, *Build a Literate Classroom* (Toronto: Irwin Publishing, 1991), p. 183.

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